these cases, between the single or double portion of sulphur, which of them is to be regarded as the elementary atom, according to Mr. Dalton's view of the subject.

Professor Berzelius next examines various compounds, which may be termed carbo-sulphurets of the alkalies and earths. The carbo-sulphuret of ammonia sublimes unchanged in close vessels; but when exposed to air, the carbon is deposited, and hydro-sulphuret is produced; and, in the same manner, the carbo-sulphurets of lime, barytes, and strontia are decomposed when moisture is present, and hydro-sulphurets of these earths are formed.

The remainder of this appendix contains the analysis of a solid white crystalline compound, having the appearance and volatility of camphor, formed by exposure of the sulphuret of carbon during three weeks to the fumes of strong nitro-muriatic acid. It is insoluble in water, but dissolves in alcohol, ether, and in oils, whether fixed or volatile. When this compound was sublimed through a red-hot tube containing iron wire, it was decomposed, and found to consist of muriatic acid, 48·74; sulphurous acid, 29·63; and carbonic acid, 21·63.

On the Means of procuring a steady Light in Coal Mines without the danger of Explosion. By William Reid Clanny, *M.D. of Sunderland. Communicated by* William Allen, *Esq. F.R.S.* Read May 20, 1813. [*Phil. Trans.* 1813, *p.* 200.]

The author having resided several years near the coal mines in the county of Durham, has paid much attention to the circumstances of those explosions which so frequently occasion the death of many industrious people, and has contrived a lamp, which he thinks likely to answer the purpose of illumination, without any danger attending its use.

He is of opinion, that ventilation, as at present practised, has little or no effect in preventing explosions; since it has no tendency to diminish the quantity of inflammable gas emitted by the old workings, which must always be in danger of exploding wherever it comes into contact with atmospheric air, if light be applied to it. The partitions and folding doors put up at the entrances of old workings appear to be very inadequate to prevent the occurrence of such explosive mixtures; and their frequency is shown by the number of accidents which the author enumerates as having taken place in his own neighbourhood alone in the course of the last seven years. The number of explosions in the course of that time has been six; and these have destroyed more than two hundred pit-men, who have left wives and children in a state of poverty and distress. In some instances, large pumps have been erected at the top of the shaft, worked by steam-engines, for the purpose of drawing off the inflammable gas from those parts where it most abounds; but even these have been found insufficient, since the engine will not, in all instances, be applied to the part where it is most wanted: and it is estimated, that wherever

the quantity of inflammable gas amounts to one twelfth part of the atmospheric air present, an explosion may take place.

For the purpose of preventing such accidents, Dr. Clanny has contrived to insulate a candle, by water placed both above and below the lantern in which it is contained. The air, which is intended to support the flame, is supplied by means of a pair of common bellows, by which it is forced through the water beneath the flame; and it is again emitted, after having supported the combustion, by a bent tube that passes into water from the top of the lantern.

In consequence of this arrangement, if the air of the mine becomes liable to inflame, the explosion will be confined to the mere content of the lantern, of which only a small part will be consumed, unless the quantity of inflammable gas be very suddenly increased.

This communication is accompanied by drawings of the lantern and its parts in detail, whereby any workman may be enabled to execute it according to the design of the author.

On the Light of the Cassegrainian Telescope, compared with that of the Gregorian. By Captain Henry Kater, *Brigade-Major. Communicated by the Right Hon. Sir* Joseph Banks, *Bart. K.B. P.R.S.* Read May 27, 1813. [*Phil. Trans.* 1813, *p.* 206.]

The author having remarked the performance of a Cassegrainian telescope, made by a self-taught artist at Ipswich, to be superior to what he believes is usually expected from telescopes of this construction, has been led to make a series of experiments on the comparative illumination given by the Cassegrainian compared with that obtained by the Gregorian construction. For though the Cassegrainian form has been considered merely as the Gregorian disguised, and has been rarely adopted, in consequence of its inverting objects, a superior power of illumination, if correctly ascertained to exist, may prove a valuable property, in addition to its advantage of being considerably shorter than the Gregorian.

In the telescope first compared by Major Kater, the specula were cast at the same time, in the same metal, and to the same pattern. The magnifying powers of the two instruments were ascertained by experiment to be very nearly equal, but with a small excess on the side of the Cassegrainian. The two telescopes were placed side by side, and pointed to the same object, which was a printed card, at the distance of fifty yards; and as the brightness, as seen in the Cassegrainian, was far superior, its aperture was first reduced by a ring of pasteboard, and then gradually enlarged till the card appeared equally bright through both telescopes. After the respective areas of aperture in each telescope had been measured, with due allowance for the light obstructed in each by the small mirror, that of the Cassegrainian was found to be to the Gregorian as 46 to 108, or 3 to 7 nearly.

In the second comparison made by Mr. Kater, the Cassegrainian